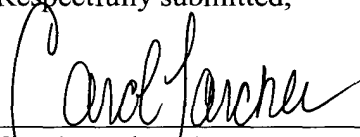


In re Appln. of Yeung et al.
Application No. Unassigned (U.S. National Phase of PCT/US00/20447)

The application is considered in good and proper form for allowance, and the Examiner is respectfully requested to pass this application to issue. If, in the opinion of the Examiner, a telephone conference would expedite the prosecution of the subject application, the Examiner is invited to call the undersigned attorney.

Respectfully submitted,



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Date: March 6, 2002

PATENT
Attorney Docket No. 215630

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Yeung et al.

Art Unit: Unassigned

Application No. Unassigned
(U.S. National Phase of PCT/US00/20447)

Examiner: Unassigned

Filed: March 6, 2002

For: METHOD OF ANALYZING MULTIPLE
SAMPLES SIMULTANEOUSLY BY
DETECTING ABSORPTION AND
SYSTEMS FOR USE IN SUCH A
METHOD

AMENDMENTS TO CLAIMS
MADE VIA PRELIMINARY AMENDMENT

Amendments to existing claims:

14. The method of claim 1 [or claim 11], wherein an optional filter is positioned between said planar array of multiple containers and said detection means, wherein said optical filter selects at least one wavelength of light from said light source.

35. The system of claim 23 [or claim 32], which further comprises an optical filter between said planar array of multiple containers and said detection means, wherein said optical filter selects at least one wavelength of light from said light source.

45. The method of claim 11, wherein an optional filter is positioned between said planar array of multiple containers and said detection means, wherein said optical filter selects at least one wavelength of light from said light source.

46. The method of claim 45, wherein a flat-field lens is positioned between said planar array of multiple containers and said detection means, wherein said flat-field lens couples light that is not absorbed by the one or more of said at least one absorbing species in each sample in the planar array of multiple containers with the detection means.

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47. The method of claim 46, wherein the coupling of light by the flat-field lens is shielded from the light source.

48. The system of claim 32, which further comprises an optical filter between said planar array of multiple containers and said detection means, wherein said optical filter selects at least one wavelength of light from said light source.

49. The system of claim 48, which further comprises a flat-field lens between said planar array of multiple containers and said detection means, wherein said flat-field lens couples light that is not absorbed by the one or more of said at least one absorbing species in each sample in the planar array of multiple containers with the detection means.

50. The system of claim 49, which further comprises a shield that shields the coupling of light by the flat-field lens from the light source.

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PENDING CLAIMS AFTER ENTRY OF PRELIMINARY AMENDMENT

1. A method of analyzing multiple samples simultaneously by absorption detection, which method comprises:

(i) providing a planar array of multiple containers, each of which contains a sample comprising at least one absorbing species,

(ii) irradiating the planar array of multiple containers with a light source comprising or consisting essentially of at least one wavelength of light that is absorbed by one or more of said at least one absorbing species, the absorption of which is to be detected, and

(iii) detecting absorption of light by the one or more of said at least one absorbing species with a detection means that is in line with the light source and is positioned in line with and parallel to the planar array of multiple containers at a distance of at least about 10 times a cross-sectional distance of a container in said planar array of multiple containers measured orthogonally to the plane of the planar array of multiple containers in the absence of a mask or slit,

wherein the detection of absorption of light by a sample in the planar array of multiple containers indicates the presence of an absorbing species in said sample.

2. The method of claim 1, which further comprises (iv) measuring the amount of absorption of light detected in (iii) for an absorbing species in a sample, wherein the

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measurement of the amount of absorption of light detected in (iii) indicates the amount of the absorbing species in the sample.

3. The method of claim 1, wherein the distance is from about 10 cm to about 50 cm.
4. The method of claim 1, wherein said planar array of multiple containers comprises capillary tubes.
5. The method of claim 4, wherein the distance is at least about 10 times the diameter of a capillary tube.
6. The method of claim 4, wherein said planar array of multiple containers comprises at least about 10 capillary tubes.
7. The method of claim 6, wherein said planar array of multiple containers comprises at least about 90 capillary tubes.
8. The method of claim 1, wherein said planar array further comprises at least one control container.
9. The method of claim 1, wherein said detection means comprises a plurality of photosensitive elements in a photodiode array.
10. The method of claim 9, wherein said photodiode array comprises linearly aligned pixels.
11. The method of claim 10, wherein each container in said planar array of multiple containers is a capillary tube and each capillary tube is optically coupled to less than about ten pixels.
12. The method of claim 1, wherein the light source comprises or consists essentially of a wavelength in the range from about 180 nm to about 1500 nm.

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13. The method of claim 12, wherein the light source has a power output of about 0.5 mW to about 50 mW.

14. The method of claim 1, wherein an optical filter is positioned between said planar array of multiple containers and said detection means, wherein said optical filter selects at least one wavelength of light from said light source.

15. The method of claim 14, wherein a flat-field lens is positioned between said planar array of multiple containers and said detection means, wherein said flat-field lens couples light that is not absorbed by the one or more of said at least one absorbing species in each sample in the planar array of multiple containers with the detection means.

16. The method of claim 15, wherein the coupling of light by the flat-field lens is shielded from the light source.

17. The method of claim 4, wherein the detection limit for rhodamine 6G for each capillary in the planar array of multiple containers is about 1.8×10^{-8} M.

18. The method of claim 4, wherein the cross-talk between adjacent capillaries is less than about 0.2%.

19. The method of claim 17, wherein the cross-talk between adjacent capillaries is less than about 0.2%.

20. The method of claim 4, wherein said sample is introduced into said capillary tube by pressure, gravity, vacuum, capillary or electrophoretic action.

21. The method of claim 1, wherein a beam expander is positioned between said light source and said planar array of multiple containers.

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22. The method of claim 1, wherein a collimating focusing lens is positioned between said light source and said planar array of multiple containers.

23. A system for use in the method of claim 1, which system comprises in the absence of a mask or slit:

(i) a light source comprising or consisting essentially of at least one wavelength of light that is absorbed by one or more absorbing species, the absorption of which is to be detected,

(ii) a planar array of multiple containers, into each of which can be placed a sample comprising at least one absorbing species, and

(iii) a detection means that is in line with the light source and is positioned in line with and parallel to the planar array of multiple containers at a distance of at least about 10 times a cross-sectional distance of a container in said planar array of multiple containers measured orthogonally to the plane of the planar array of multiple containers.

24. The system of claim 23, wherein the distance is from about 10 cm to about 50 cm.

25. The system of claim 23, wherein said planar array of multiple containers comprises capillary tubes.

26. The system of claim 25, wherein the distance is at least about 10 times the diameter of a capillary tube.

27. The system of claim 25, wherein said planar array of multiple containers comprises at least about 10 capillary tubes.

28. The system of claim 27, wherein said planar array of multiple containers comprises at least about 90 capillary tubes.

29. The system of claim 23, wherein said planar array further comprises at least one control container.

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30. The system of claim 23, wherein said detection means comprises a plurality of photosensitive elements in a photodiode array.

31. The system of claim 30, wherein said photodiode array comprises linearly aligned pixels.

32. The system of claim 31, wherein each container in said planar array of multiple containers is a capillary tube and each capillary tube is optically coupled to less than about ten pixels.

33. The system of claim 23, wherein the light source comprises or consists essentially of a wavelength in the range from about 180 nm to about 1500 nm.

34. The system of claim 33, wherein the light source has a power output of about 0.5 mW to about 50 mW.

35. The system of claim 23, which further comprises an optical filter between said planar array of multiple containers and said detection means, wherein said optical filter selects at least one wavelength of light from said light source.

36. The system of claim 35, which further comprises a flat-field lens between said planar array of multiple containers and said detection means, wherein said flat-field lens couples light that is not absorbed by the one or more of said at least one absorbing species in each sample in the planar array of multiple containers with the detection means.

37. The system of claim 36, which further comprises a shield that shields the coupling of light by the flat-field lens from the light source.

38. The system of claim 25, wherein the detection limit for rhodamine 6G for each capillary in the planar array of multiple containers is about 1.8×10^{-8} M.

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39. The system of claim 25, wherein the cross-talk between adjacent capillaries is less than about 0.2%.

40. The system of claim 38, wherein the cross-talk between adjacent capillaries is less than about 0.2%.

41. The system of claim 25, which further comprises a means to introduce said sample into said capillary tube.

42. The system of claim 41, wherein said sample is introduced into said capillary tube by pressure, gravity, vacuum, capillary or electrophoretic action.

43. The system of claim 23, which further comprises a beam expander between said light source and said planar array of multiple containers.

44. The system of claim 23, which further comprises a collimating focusing lens between said light source and said planar array of multiple containers.

45. The method of claim 11, wherein an optional filter is positioned between said planar array of multiple containers and said detection means, wherein said optical filter selects at least one wavelength of light from said light source.

46. The method of claim 45, wherein a flat-field lens is positioned between said planar array of multiple containers and said detection means, wherein said flat-field lens couples light that is not absorbed by the one or more of said at least one absorbing species in each sample in the planar array of multiple containers with the detection means.

47. The method of claim 46, wherein the coupling of light by the flat-field lens is shielded from the light source.

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48. The system of claim 32, which further comprises an optical filter between said planar array of multiple containers and said detection means, wherein said optical filter selects at least one wavelength of light from said light source.

49. The system of claim 48, which further comprises a flat-field lens between said planar array of multiple containers and said detection means, wherein said flat-field lens couples light that is not absorbed by the one or more of said at least one absorbing species in each sample in the planar array of multiple containers with the detection means.

50. The system of claim 49, which further comprises a shield that shields the coupling of light by the flat-field lens from the light source.